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(54) Extruder for products in reinforced concrete

(57) The device has a steel structure, composed of various parts, which functions by sliding along a linear plate delimited by two tracks (6). It can be placed directly on the ground or on a raised metal structure and has a piece of heated sheet metal at its base in order to speed up the drying process of the concrete.

The device, which is particularly easy to use, enables one to rapidly produce series of concrete section bars for floors with technical characteristics that may vary with the substitution of moulding tubes (21). The moulding tubes (21) may be simply substituted by other tubes of different shapes and sizes, without the need to make any further adjustments to the system. The moulding motion of the section bar is ensured by a gear-motor (2) which, through means of a cam (11), pushes a comb (20) which compacts the material every time it is deposited by the hopper (17). The hollow interior of the section bar is ensured by the vibration of an appropriately shaped set of cores (22). The outside dimensions are defined by two side plates (24) and an upper plate (29), while the product being worked rests on a lower plate.

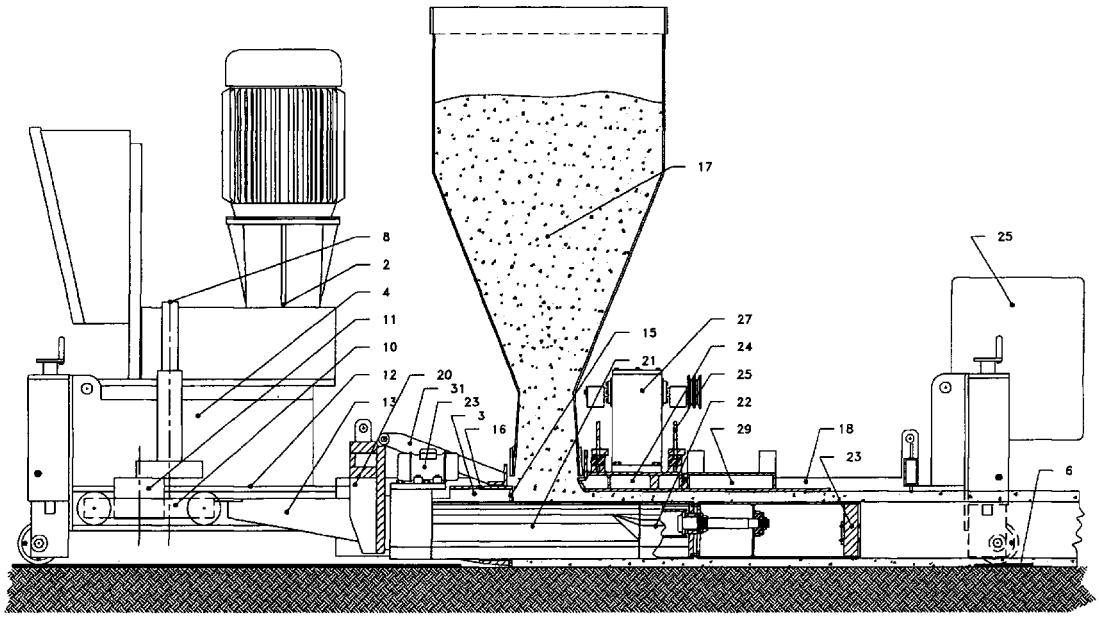

FIG. 1

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Description

[0001] The machine has a steel structure, composed of various parts, which functions by sliding along a two-lined track (6). It can be placed directly on the ground or on a raised metal structure and has a piece of heated sheet metal at its base in order to speed up the drying process of the product The distance between the tracks essentially depends upon the type of floor slab that one intends to make with the extruder.

[0002] The structure is composed in the following way:

[0003] There are two side members (1) of appropriate length, to which all the other components of the machine are anchored in various ways. On the front part, in accordance with the machine's running direction, a power unit - speed reducer (2) is located, which serves to set the feed pushe in motion (3). This unit is anchored to a supporting structure (4), which in turn is joined to the supporting side members. At the ends of these members there are two pairs of wheels (5) which rest on two tracks (6) and are supported by uprights that may be adjusted in height (7). The power unit - speed reducer sets in motion an axle (8), which has a cam at its lower end, fitted inside the truck (10). This truck is able to slide forwards and backwards with a movement that is equivalent to twice the eccentricity of the cam (11). This is made possible by the presence of four wheels which are kept in line by two guides (12), joined to the body of the machine.

[0004] Linked to the truck (10) is a feed pusher (3) which is made up of an appropriate number of metal sheets (13), set apart at varying distances according to the type of shape required. These metal sheets are attached at one end by an 'L' shaped compacting plate. The vertical part of this (15) serves to press and consolidate the material being worked, while the horizontal part (16) serves to open and close the mouth which takes in the material. This mouth is merely the lower opening of the hopper (17) which contains the concrete. The plate (16) which opens and closes the mouth of the hopper, slides against a scraper (31), preventing the

[0005] In the existing space between the power unit - speed reducer (2) and hopper (17) is a comb (20) to which the moulding tubes (21) and finishing tubes (22) are attached elastically through means of rubber supports. The tubes in turn are linked by a rubber ring (26). Every moulding tube is provided with a vibrator (23) so that each one may be adjusted by increasing or diminishing the vibration, depending on the quality of the extruded item. The moulding tube (21) does not have a constant section, but the part into which the material to be worked drops has smaller dimensions to allow a greater quantity of concrete to drop through. At the tip, where the worked material comes out, the section progressively increases until it arrives at the definitive form of the article to be produced. Compression of the concrete together with further pressure exercised by the feed pusher's compacting plate (15) determines a notable resistance of the item being made. The vibration of moulding tubes is necessary to allow the material, which drops through the hopper's lower opening, to initially fill all the available spaces evenly, and then to slip smoothly down the outer walls of the moulding tubes. The upper part of the product is smoothened through means of two plates. The first plate which comes into contact with the concrete as it passes through the extruder is the vibrating plate (24), which is anchored to the machine's longitudinal members by two beams (25), in turn linked to two turrets (30) which are positioned at the sides of the plate itself and above the longitudinal members. The vibrating plate is equipped with a unidirectional vibrator (27) which produces an exclusively vertical vibration of the plate itself. The link between the vibrating plate and beams connecting the turrets is achieved through two series of flexible rubber supports (28). Once the moulding process is completed, the concrete mix is brought to an optimal level of surface and internal finishing, using the finishing plate (29) and internal finishing tubes (22). The finishing plate is formed by a solid steel structure which smoothens the upper surface of the concrete and effects an ulterior, though minimal compaction, reducing by a further few millimetres the volume taken up by the concrete. It is connected to the side members of the machine by two turrets (31), similar to those used for the vibrating plate unit. The tip of the finishing tube, which is connected to the moulding tube, has the same dimensions. Instead, the part where the item is expelled has smaller dimensions. This determines a gradual decrease in the compression of the concrete which can smoothly slide down these and obtain perfect internal uniformity. To prevent the vibration present in the moulding tubes (21) from passing to the finishing tubes (22), weights (23) are applied to the ends of the latter, adequately sized to dampen unwanted vibrations.

[0006] The form of the section bar's sides is obtained through means of two side panels (24) which are joined to the two side members of the machine (1). The profile of the side panels, starting from the point where the material to be worked drops, as in the case of the moulding tubes, progressively narrows so that the concrete is highly compressed until it arrives at the dimensions of the final product.

[0007] At the machine's rear end is a counterweight (25) with dimensions that ensure proper adherence to the track and prevent upward vertical pressure, determined by the force of the feed pusher on the concrete being worked.

[0008] The side members (1) contain two other members within, which are fixed together with bolts. It is interesting to note that by removing these bolts and those which link the truck to the feed pusher's sheets of metal (13), one is very quickly able to substitute the die in order to produce concrete floor slabs with different dimensions and characteristics.

[0009] The functional description of the machine is as

follows: the power unit - speed reducer sets the camshaft in rotatory motion. This in turn sets the truck in motion which transforms the rotatory motion into alternated rectilinear motion. The truck then triggers off the feed pusher, which in the first phase of the work cycle, moves backwards together with the truck twice the distance of the cams' eccentricity. This movement determines the opening of the compacting plate of the hopper's mouth and consequent fall of concrete into the space between the moulding side panels and moulding tubes. When the cam completes its rotation the truck moves back to where it was previously as do the feed pusher and compacting plate. The latter, at the same time, sees that the mouth into which the material is fed is closed, and starts to compress the concrete down towards the portion of material worked in the previous cycles. When the feed pusher, in its alternated motion, reaches the point where it exercises maximum pressure on the concrete, the rubber supports which sustain the vibrating plate are compressed, increasing the volume of space for the concrete, yet exercising considerable pressure on it. At this point, the concrete is gradually compressed further with the vibration of the plate, allowing the rubber supports to reassume their initial dimensions. The finishing plate, finishing tubes and side panels smoothen the inner and outer surfaces of the product, achieving the level of surface texture required by the installers of prefabrications produced by the machine. Steel strands may be incorporated into the concrete when casting. The more strands used, the greater the length of the floor slabs.

[0010] Elongation of the form produced comes about through repeating the cycle described above. One should observe that the machine only succeeds to slide on the tracks when the pressure exercised by the feed pusher on the concrete being worked is such that it overcomes the machine's resistance to move. This ensures that the concrete is exceptionally uniform and compact.

[0011] Once dry, the form is cut using appropriately sized saws which move through means of the same tacks used by the prestressed reinforced concrete floor slab machine.

[0012] There are machines available on the market which achieve forming with screw systems or with machines towed by cables. In the first case, the main disadvantages lie in the need to constantly substitute the mechanical parts which are subject to considerable wear and high energy consumption owing to the quantity of organs in motion. In order to produce articles with different heights it is necessary to change the die every time, and it is almost impossible to obtain non-circular lightening holes.

[0013] The main disadvantage with the second type lies in the fact that the finished product is not sufficiently resistant, since compaction is effected exclusively through vibrators.

Claims

1. A production system for concrete section bars, which functions through the longitudinal movement of the apparatus, in reciprocating rectilinear motion according to the described procedure.

2. A device, as in statement 1, which creates the internal form of the concrete section bars through means of moulding tubes. According to technical or aesthetic requirements, the tubes may be given a variety of dimensions and forms without having to adjust the device with each substitution.

3. A device, as in statements 1 and 2, which links the front part to the back part of the cores that generate the product's holes. This eliminates the vibrating effects produced on the front part of the cores and enables the rear parts to remain stable. In this way, the inside walls of the product's holes can be smoothened.

4. A pushing comb for the device as in statements 1 and 2, structured and positioned so that it may open or close in synchronization the mouth of the hopper into which the concrete is fed.

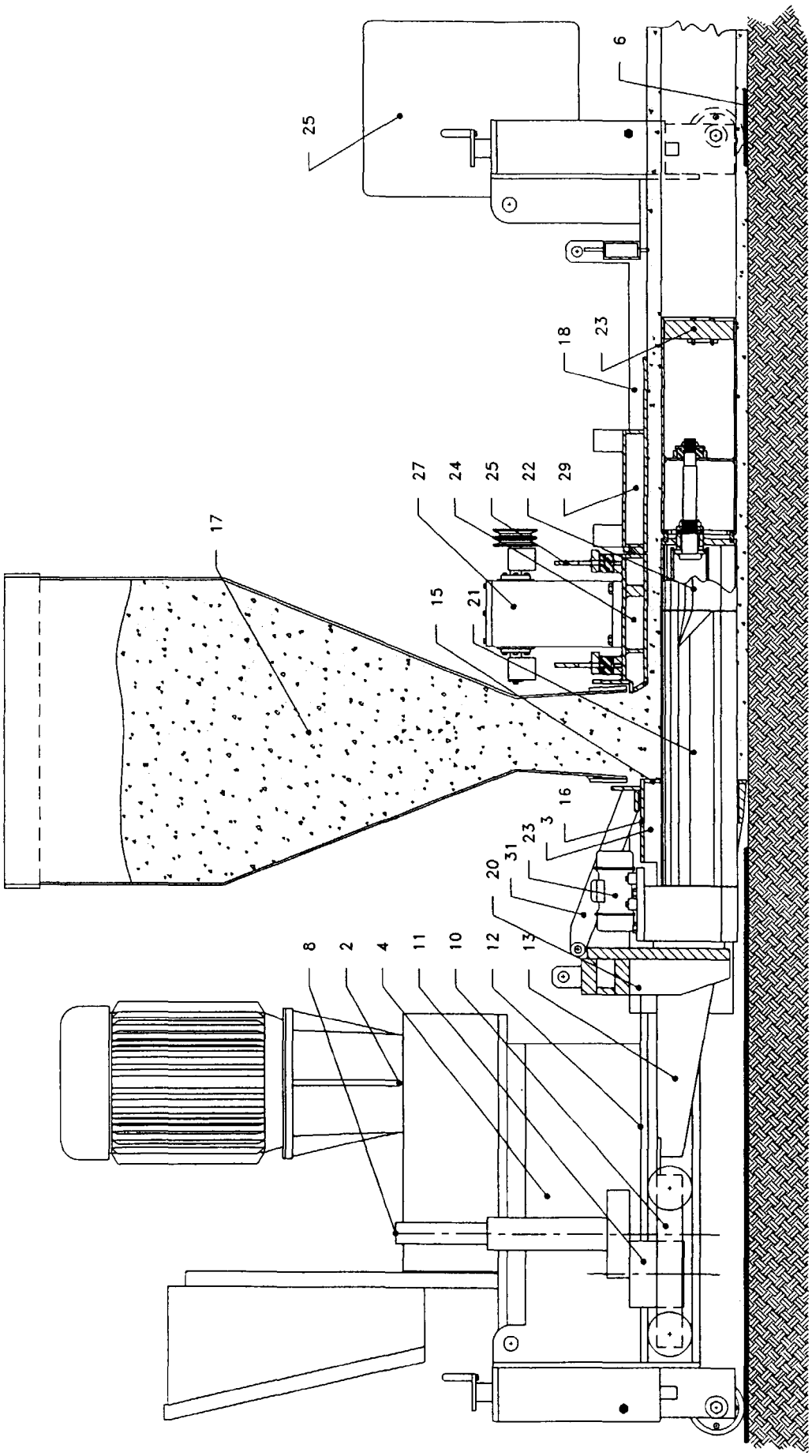

FIG. 1

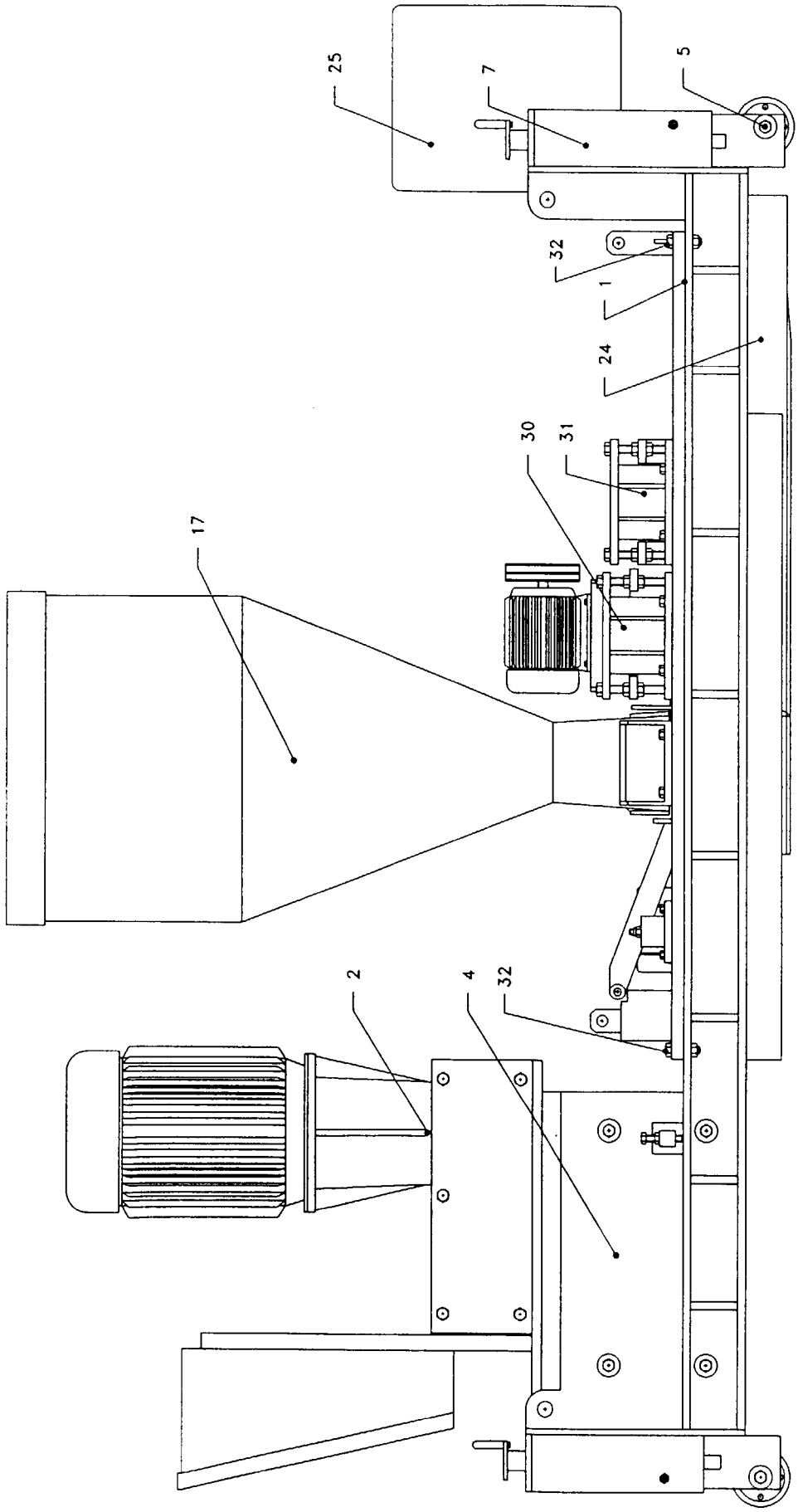

FIG. 2

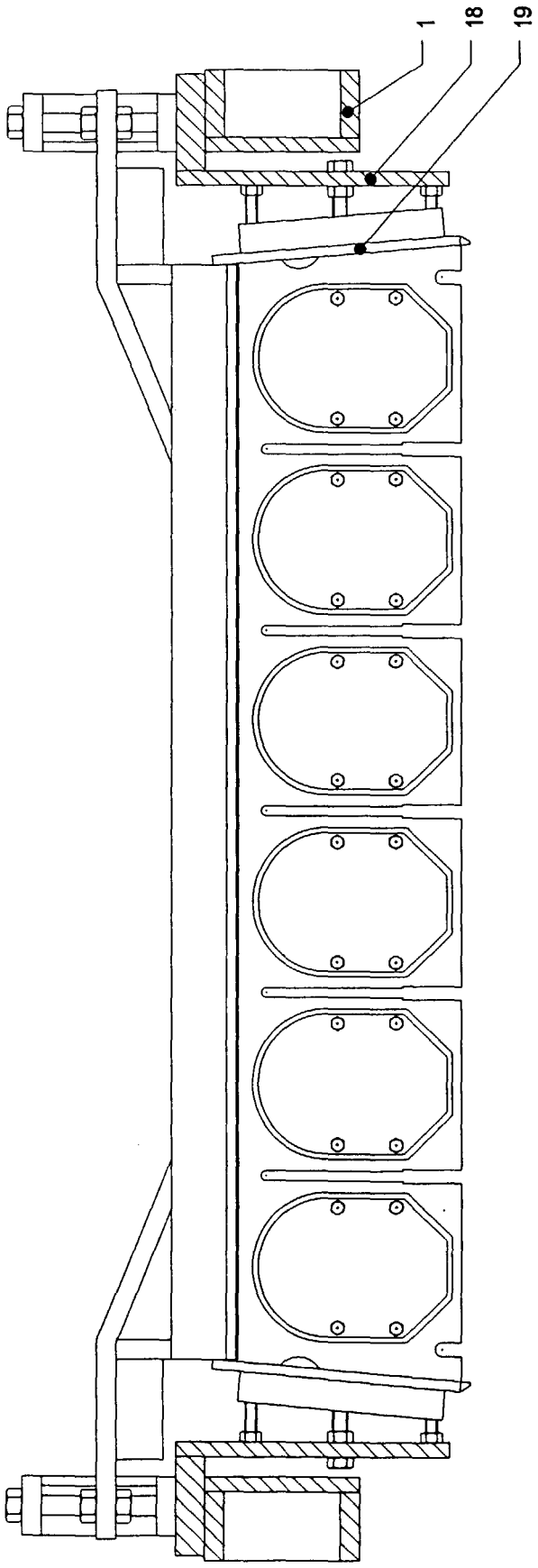

FIG. 3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 98 83 0402

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US 3 143 781 A (A.KALNS) 11 August 1964 * the whole document * * column 3, line 32 - column 3, line 36 * * column 4, line 25 - column 4, line 38 *	1-4	B28B1/08
X	DE 22 25 413 A (STETTER GMBH) 6 December 1973 * the whole document *	1-4	
X	FR 2 199 284 A (ROTH KG MASCHINENFABRIK MAX) 5 April 1974 * the whole document *	1-4	
X	US 1 606 160 A (C. B. FOSTER) 9 November 1926 * the whole document *	1,2,4	
X	WO 95 16078 A (GILLIDELL PTY LTD ;RADLEY MARK STEVEN (AU)) 15 June 1995 * the whole document *	1	
A	EP 0 080 333 A (DY CORE SYST IRELAND) 1 June 1983 * page 5, line 15 - page 5, line 28 * * figure 4 *	3	TECHNICAL FIELDS SEARCHED (Int.Cl.6) B28B E01C
A	DE 965 687 C (EISENWERKE MÜLHEIM/MEIDERICH AKTIENGESELLSCHAFT) * the whole document *	1	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	4 December 1998	Gourier, P

CATEGORY OF CITED DOCUMENTS

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